



uvSVP Operating Manual



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© 2023 Valeport Ltd

Valeport Ltd
St Peter's Quay
Totnes TQ9 5EW
United Kingdom

Phone: +44 1803 869292
email: sales@valeport.co.uk
Web: www.valeport.co.uk

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1 Introduction

This manual covers the basic specifications, deployment and maintenance procedures for the uvSVP. The instrument can be controlled by sending commands directly, using a suitable terminal emulation program such as Valeport Terminal or HyperTerminal.

The instrument is based on Valeport's existing "mini" sensor range and has been designed to be simple to use and maintain, as well as being small and lightweight for easy handling and deployment.

From April 2021 new firmware has allowed the addition of the Valeport DASH formula to calculate Salinity and, therefore, Density from the measured values of sound speed, pressure and temperature – see [DASH Enabled Output Telegram](#)

2 Specifications

2.1 Performance

| Sensor | | |
|----------------|------------|------------------------------------|
| Sound Velocity | Range | 1375 – 1900m/s |
| | Accuracy | ±0.02m/s |
| | Resolution | 0.001m/s |
| | Frequency | 2.5 MHz |
| Pressure | Range | 10, 20, 30, 50, 100, 200 or 300Bar |
| | Accuracy | ±0.01% range |
| | Resolution | 0.001% range |
| Temperature | Range | -5 to +35°C |
| | Accuracy | ±0.01°C |
| | Resolution | 0.001°C |

Certain features of the sensors used in the “mini” range are designed specifically to enable high quality data to be delivered:

2.1.1 Carbon Composite Rods

The carbon composite material used for the sensor spacer rods has been specifically selected to provide 3 features:

- a) Excellent corrosion resistance
- b) Very high strength
- c) Virtually zero coefficient of thermal expansion

This last point is particularly important; accurate sound velocity measurement relies on measuring the time taken for a pulse of sound to travel a known distance. The material selected does not measurably expand over the operating temperatures of the instrument, ensuring the highest possible accuracy at all times.

2.1.2 Digital Sampling Techniques

Enables a timing resolution of 1/100th of a nanosecond, equivalent to about 0.5mm/sec speed of sound on a 25mm path sensor. In practice, the output is restricted to 1mm/sec resolution.

2.2 Output

Units are fitted with both RS232 and half-duplex RS485 communications as standard, selected by pin choice on the output connector. Protocol is 8 data bits, 1 stop bit, no parity, and no flow control.

- Baud rate is factory set to 19200
- User may choose between 2400, 4800, 9600, 19200, 38400, 57600, 115200
- Sample rate up to 30Hz

fast sampling rates may not be possible with low baud rates

| Connection | |
|------------|---|
| | Standard is SubConn type MCBH6F titanium Alternatives may be supplied on request |
| | Wiring Information is in Section 6 |

2.3 Power

| Power | |
|----------|-------------------|
| External | 9 – 28v DC input |
| | 0.36W (30mA @12v) |

3 DASH Enabled Output Telegram

From directly measured sound velocity, temperature and pressure, SWiFT calculates Salinity using a proprietary Valeport algorithm developed from extensive laboratory and field work. This Salinity value is then used to compute Conductivity using standard EOS80 formulas.

[A new salinity equation for sound speed instruments - Allen - 2017 - Limnology and Oceanography: Methods - Wiley Online Library](https://aslopubs.onlinelibrary.wiley.com/doi/pdf/10.1002/lom3.10203)

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In order to enable these data fields:

| Code | Followed By | Operation |
|------|------------------------|---|
| #120 | :ON<CR> or ;OFF<CR> | Turns the Density and Salinity calculations ON or OFF Only available in Valeport output format Max 8Hz update rate at 19200 baud rate |
| #121 | <CR> | Reads if Density calculation is fitted. |

3.1 Calculated Salinity

| | |
|-------------|-----------|
| Accuracy: | ±0.05 PSU |
| Resolution: | 0.001 PSU |

3.2 Calculated Density

| | |
|-------------|-------------------------|
| Accuracy: | ±0.05 kg/m ³ |
| Resolution: | 0.001 kg/m ³ |

4 Data Request

The instrument responds to a series of text commands that are detailed below for those users who wish to interface the uvSVP to other systems.

This list is not comprehensive but will allow the standard functions of the instrument to be accessed. For more detailed information, please contact Valeport Ltd.

- All commands must be confirmed using “Carriage Return” or “Enter” on the keyboard, with the exception of the “Stop” command (#).
- All commands are echoed back by the instrument as they are typed

| Code | Followed By | Operation |
|------|----------------------|---|
| # | | Interrupts instrument when running |
| M | rate<CR> | Performs continuous measurement at set rate. M1 = 1 Hz M2 = 2 Hz M4 = 4 Hz M8 = 8 Hz |
| S | <CR> | Returns a single reading |
| #001 | ;address<CR> | Sets the RS485 address |
| #002 | <CR> | Returns the RS 485 address |
| #004 | <CR> | Read header info |
| #005 | ;ON<CR> or ;OFF<CR> | Turns ON or OFF address mode |
| #006 | <CR> | Returns ON or OFF status for address mode |
| #009 | ; <CR> or ;VALUE<CR> | Sets the Tare value ; <CR> = a reading is taken to use as Tare ;VALUE<CR> = User entered value in units as set by #018 command |
| #010 | <CR> | Returns the Tare value |
| #011 | ;ON<CR> or ;OFF<CR> | Turns Tare function ON/OFF |
| #012 | <CR> | Reads Tare mode |
| #018 | ;Pressure units<CR> | Set to either 0 = dBar 1 = Metres 2 = Feet |
| #019 | <CR> | Read pressure units |
| #026 | ;Separator<CR> | Sets the output string separator (1 char) |
| #027 | <CR> | Returns the Valeport output string separator |
| #028 | <CR> | Set the unit into run mode |
| #029 | <CR> | Read run mode |
| #032 | <CR> | Returns the software version number. |
| #034 | <CR> | Returns the units serial number |

| Code | Followed By | Operation |
|------|---------------------|---|
| #039 | ;ModeValue<CR> | Set mode without putting unit into run mode Where M1 = 1 Hz continuous output M2 = 2 Hz continuous output M4 = 4 Hz continuous output M8 = 8 Hz continuous output M16 = 16 Hz continuous output |
| #040 | <CR> | Read operating mode. |
| #042 | ;ON or OFF | Enable/disable leading separator |
| #043 | <CR> | Read leading separator (on or off) |
| #044 | ;ON or OFF | Enable/disable trailing separator |
| #045 | <CR> | Read trailing separator (on or off) |
| #059 | ;baud_rate<CR> | Sets the units baud rate 2400,4800,9600,19200,38400;57600;115200 |
| #082 | ;x | Set the output string |
| #083 | ;0 or 1 or 2 or 3 | Setup the pressure output format Where 0=not fitted, 1=PPPP.P, 2=PPP.PP, 3=PP.PPP |
| #084 | <CR> | Returns the pressure range |
| #091 | ;ON<CR> or ;OFF<CR> | Sets startup mode. OFF=No readings at startup, ON=Readings at last rate at startup |
| #102 | ;ON or OFF<CR> | Sets RS485 mode |
| #103 | <CR> | Sends RS485 mode |

5 Output Format

Real time data follows the format described below.

Use #091 to control whether the instrument starts sampling as soon as power is applied or waits for a command, e.g.

```
10.351 21.488 1506.739
```

- The data separator is a space (this may be altered if required).
- Leading and trailing spaces are enabled (this can be altered if required).
- Data is presented in the order:
 - Pressure
 - Temperature
 - Sound Velocity
- Pressure data format is dependent on sensor range, and may be any of the following. Leading zeroes are included, so it is a fixed length string:
 - PPPP.P (e.g. 0123.4 dBar)
 - PPP.PP (e.g. 012.34 dBar)
 - PP.PPP (e.g. 12.345 dBar)
- The temperature data is given to 3 decimal places. Value is in °C and leading zeroes are included; signed if negative:
 - 21.456
 - 02.769
 - -01.174
- Sound Velocity is given in m/s, as a fixed length string with 3 decimal places
 - In air, the sensor reads 0000.000

5.1 Standard Format

from April 2021:

| | | |
|----------|--|----------|
| Command: | #082;3 | |
| Format: | x.xxx t.ttt cccc.ccc (DASH disabled #120;0) x.xxx t.ttt cccc.ccc ssss.sss dddd.dd (DASH enabled #120;1) | |
| Notes: | Field | Format |
| | Pressure Depth (d M f) | x.xxx |
| | Temperature (°C) | t.tttt |
| | Sound Speed (ms ⁻¹) | cccc.ccc |
| | Salinity (PSU) | ssss.sss |
| | Density (kg/m ³) | dddd.ddd |

Output String Examples

with DASH disabled

```
09.812 20.571 1504.164
```

```
09.821 20.572 1504.164
```

with DASH enabled

```
09.812 20.571 1504.164 0017.811 1011.610
```

```
09.821 20.572 1504.164 0017.810 1011.609
```

5.2 Data String #1

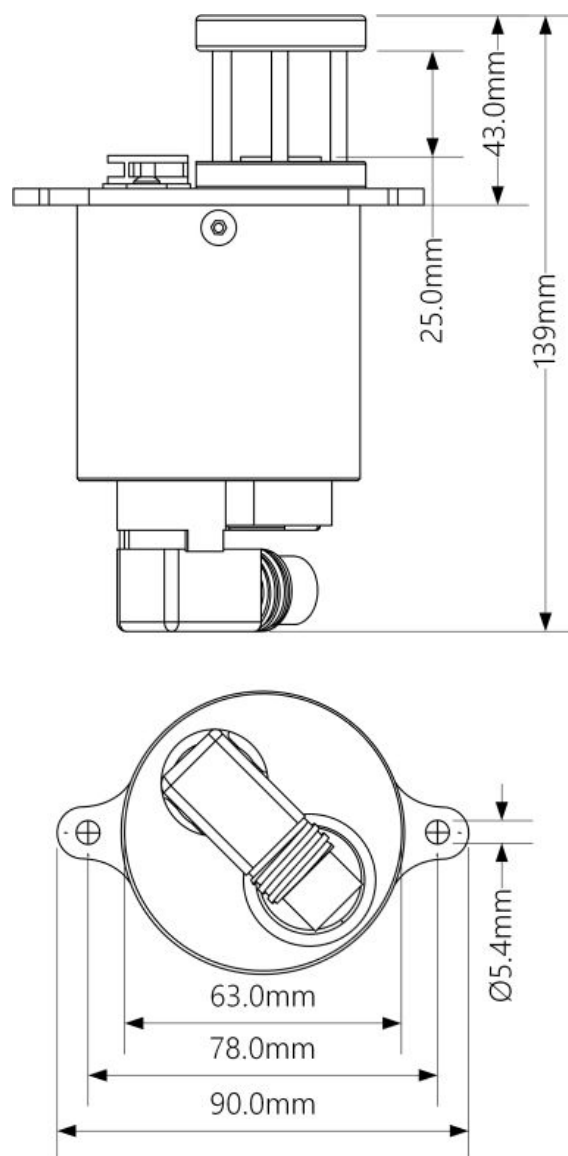
A dual output string - Customer specific requirement

| | | |
|----------|---|----------------|
| Command: | #082;MSUBS | |
| Format: | xxxx.xxx cccccc \$PSGDS,ADSVP,xxxx.xxx,cccc.ccc,tt.tttt,dddd.dd*zz | |
| Notes: | First String: | |
| | Field | Format |
| | Pressure Depth (d M f) | xxxx.xxx |
| | Speed of Sound | ccccccc |
| | Second String: | |
| | Field | Format |
| | NMEA Header | \$XXXXXX,XXXXX |
| | Pressure Depth (d M f) | xxxx.xxx |
| | Speed of Sound (ms ⁻¹) | xxxx.xxx |
| | Temperature (°C) | xx.xxx |
| | Density (kg/m ³) | xxxx.xxx |

Output String Examples

```
0009.919 1505340
$PSGDS,ADSVP,0009.919,1505.340,21.972,1130.56*1E
0009.830 1504058
$PSGDS,ADSVP,0009.830,1504.058,21.959,1130.80*1D
0009.829 1504131
$PSGDS,ADSVP,0009.829,1504.131,21.964,1130.85*10
```

6 Dimensions and Materials



| Housing Ø | Mounting bulkhead Ø | Overall length | Weight in Air |
|-----------|---------------------|----------------|---------------|
| 63mm | 90mm | 139mm | 0.726 Kg |

Materials:

| Part | Material |
|-----------------------|--|
| Main housing | Titanium |
| Sensor bulkhead | Titanium |
| Connector | Titanium SubConn MCBH6F Right Angle |
| Sound Velocity Sensor | Carbon Composite legs, Titanium Body, Ceramic Transducer behind polycarbonate window |
| Temperature sensor | Titanium |
| Pressure sensor | Hastelloy |

7 Wiring Information

Wiring colours are correct at the time the manual was printed. However, it is advised that continuity checks are performed prior to all terminations.

Systems are supplied with a short (50cm) lead for splicing or testing

| Subconn 6 pin male line (MCIL6M) | | 9 Way D Type | 4mm Banana Plugs |
|----------------------------------|--|------------------------|------------------|
| Pin | Function | Pin | Pin |
| 1 | RS232 GND | 5 (Link to 1,6,8,9) | |
| 2 | RS232 Tx (Out of sensor) or RS485A | 2 | |
| 3 | RS232 Rx (Into sensor) or RS485B | 3 | |
| 4 | +V | | Red Plug |
| 5 | Link to Pin 1 for RS485. N/C for RS232 | | |
| 6 | Power GND | | Black Plug |

8 Ordering and Part Numbers

| Part No. | Description |
|-------------|--|
| 06520549-XX | uvSVP Fitted with: 25mm Carbon composite time of flight SV sensor 0.01% accuracy piezo-resistive pressure sensor PRT Temperature Sensor Supplied with: Interface lead USB Y lead Operating manual and transit case |

9 EU Declaration of Conformity - CE Marking

Any changes or modifications to the product or accessories supplied, that are not authorised by Valeport Ltd, could void the CE compliance of the product and negate your authority to operate it. This product has demonstrated CE compliance under conditions that include the use of shielded cables. It is important that you use shielded cables compliant with the product's conformance, to protect from potential damage and reduce the possibility of interference to other electronic devices



EU Declaration of Conformity



| | |
|-------------------------------|---|
| Manufacturer: | Valeport Ltd |
| Address: | St Peter's Quay, Totnes, Devon, TQ9 5EW |
| Certification marking: | CE |
| Product Description: | UV-SVP, Sound Velocity Profiler. |

We the manufacturer declare that the product **UV-SVP**, is in conformity with the following EU Directives and harmonised standard(s):

| EMC Directive 2014/30/EU | Standards |
|--------------------------|----------------------------------|
| EMC (Article 3.1b) | BS EN 61326-1:2013 (Basic Level) |

| RoHS Directive 2011/65/EU | Standards |
|-----------------------------|------------------|
| Prevention (Article 4.1) | BS EN 50581:2012 |

| | |
|------------------------|---|
| Name: | Jason Horsell |
| Position | Development Engineer |
| Place of issue: | Valeport Ltd, Totnes, UK |
| Date of issue: | 09 th January 2018 |
| Signature: |  |



Valeport Limited, St. Peter's Quay, Totnes, Devon, TQ9 5EW UK
 Tel: +44 (0)1803 869292 Fax: +44 (0)1803 869293
 E-mail: sales@valeport.co.uk Web: www.valeport.co.uk
 VAT No: GB 165 8753 67 Registered in England No: 1950444

